

SUMMARY

An Increase of Tumor Necrosis Factor-Alpha (TNF- α) Level and Polymorphonuclear (PMN) Cells in Nasal Lavage Liquid of Rice Mill Operator Exposed to Lipopolysaccharide Endotoxin

Indonesia is an agricultural country that continuously develops agricultural industry. One of the developments in agriculture is by developing rice mill. The process of paddy becomes rice at the rice mill gives positive impact because it creates an employment and food self-sufficiency that can increase a public welfare. However, it also gives negative impact which is a risk of suffering disease due to the exposure of rice dust. ILO (International Labour Organization) reported that around 40.000 new cases of pneumoconiosis (respiratory problem) which are caused by the exposure of dust at workplace in around the world every year.

The rice dust is categorized as organic dust, particularly grain dusts. This dust is produced in the process of sun drying and milling. The dust of rice mill that contained lipopolysaccharide endotoxin is a risk factor of either acute inflammation or chronic inflammation which are indicated by the increase of Tumor Necrosis Factor (TNF- α) and polymorphonuclear (PMN) cells. Besides, the dust of rice mill also causes a change of pulmonary function and respiratory complaints of workers who worked at the rice mill.

The rice mill industry at Palur village, Kebonsari sub-district, Madiun district, is one of the industries of rice producer is large quantities. This industry employed 28 persons in production unit that is the process of paddy become rice which started from sun drying phase, milling phase, packaging phase, and storing phase. Each phase, there is relative high dust concentration. Besides, a machine of production that is not completed by dust collector and ventilation caused the dust concentration in production room extremely high. The workers who do not wear mask had possibility to breath dust in large number. Hence, the risk of suffering respiratory problem is extremely high. Therefore, the aim of this study was to analyze the level of LPS endotoxin in personal dust and the influence of it toward the increase of TNF- α level, the number of PMN cells in nasal lavage liquid, the decrease of pulmonary function, and respiratory complaints of workers who worked at the rice mill. This study was designed as respective longitudinal study. The sample of the study was 11 operators of rice mill. The data of the study was obtained by interviewing in order to analyze the workers' characteristics and their respiratory complaints, measuring the level of personal dust that utilized Personal Dust Sampler (PDS) in gravimetry analysis, and measuring the pulmonary function by utilizing spirometer. A taking of nasal lavage liquid and spirometry were done before and after working (cross shift). The TNF- α level and LPS endotoxin level were analyzed by utilizing ELISA technique, afterwards, LPS was analyzed by utilizing LAL method, and for the was analyzed by utilizing leukocyte count method. Moreover, the independent variables of this study were the level of dust and LPS endotoxin. Meanwhile, the dependent variables of this

study were TNF- α level and the number of PMN cells, pulmonary function (FVC and FEV1), and respiratory complaints. The workers' characteristics which involved were age, work time, and smoking habit were the distractor variables of this study.

The result of this study showed that the average of dust level was 2,20 mg/m³, and the LPS endotoxin was 54,4 EU/m³. Moreover, it was occurred the increase of TNF- α level and the number of which was 100%. The decrease of FVC was 72,73% and FEV1 was 63,64%. The mild respiratory complaints was 9,09% and for the medium one was 90,01%. The normal pulmonary function was 36,36%, Obstruction was 36,36% and restriction was 27,27%. The dust level did not correlate with the LPS level in personal dust ($p > 0,05$). Meanwhile, LPS endotoxin had significant influence toward the increase of TNF- α level and the number of PMN cells in worker's nasal lavage liquid ($p=0,000$), whereas, the dust level and the workers' characteristics had no significant influence ($p > 0,05$). Besides, LPS endotoxin, age, work time, and smoking habit also had significant influence toward the decrease of FVC and FEV1, except work time, and all variables had no significant influence toward the respiratory complaints ($p > 0,05$).

Based on the result of this study, it is concluded that the dust level does not influence toward LPS endotoxin level in personal dust. Besides, it was occurred the increase of TNF- α level and the number of PMN cells in nasal lavage liquid of workers who work at the rice mill. Moreover, LPS endotoxin is the factor that influenced toward the increase of TNF- α level and the number of cells. In the other hand, LPS endotoxin also influences toward the decrease of pulmonary function, however, it does not influence toward the worker's respiratory complaints. Therefore, the exposure of LPS endotoxin is really potential to cause either acute inflammation or chronic inflammation of respiratory canal and to cause the decrease of pulmonary function for workers who work at the rice mill. In addition, the result of this study could be a reference to do prevention and protection toward various respiratory problems for workers who work at the rice mill and who work at all aspects in agricultural field. The effort of the prevention such as modifying or using rice mill machine which could collect dust, checking periodically the worker's health in order to know early the workers who had the symptoms of the disease could have a treatment and break or shift, and using mask for workers while working.

ABSTRACT

An Increase of Tumor Necrosis Factor-Alpha (TNF- α) Level and Polymorphonuclear (PMN) Cells in Nasal Lavage Liquid of Rice Mill Operator Exposed to Lipopolysaccharide Endotoxin

Lipopolysaccharide endotoxin in rice dust is a risk factor of increase of TNF- α , PMN cell, decrease of pulmonary function and respiratory complaint of the rice mill operators. The aim of this study was to analyze the level of LPS endotoxin in personal dust, TNF- α level, the number of PMN cells in Nasal Lavage Liquid (NAL), and the decrease of pulmonary function even respiratory complaints of the rice mill operators. The sample of the study was 11 operators of rice mill. The data of the study was obtained by interviewing in order to analyze the workers' characteristics and their respiratory complaints, measuring the level of personal dust by utilizing personal Dust Sampler (PDS), and measuring the pulmonary function by utilizing spirometer. The TNF- α level and LPS endotoxin were analyzed by utilizing ELISA technique, afterwards, LPS was analyzed by utilizing LAL method, and for the PMN was analyzed by utilizing leukocyte count method. The study result showed the average of dust level was 2,20 mg/m³, and the LPS endotoxin was 54,4 EU/m³. Moreover, it was occurred the increase of TNF- α level and the number of PMN which was 100%. The decrease of FVC was 72,73% and FEV1 was 63,64%. The mild respiratory complaints was 9,09% and for the medium one was 90,01%. The obstruction pulmonary function was 36,36% and restriction was 27,27%. Therefore, LPS endotoxin had significant influence toward the increase of TNF- α level and the number of PMN cells in worker's NAL ($p=0,000$). Besides, LPS endotoxin significant influence toward the decrease of FVC and FEV1. Conclusion: There are increase of TNF- α level and the number of PMN cells in NAL after working. The lipopolysaccharide endotoxin also influence toward the decrease of pulmonary function of the rice mill operators. Suggestion: some preventions should be done are by using a machine of rice mill which could gather dust, ventilation, proportional workplace, by checking health periodically for workers, and by using mask while working.

Keywords: LPS endotoxin, nasal lavage, PMN, pulmonary function, respiratory complaint, rice mill operator, TNF- α .